PERIODIC
Denmark. Dan. Fisk. Havs.
V. 2, no. 1 meddel. Serie: Fisk.

LIBRARY
FISH & WILDLIFE SERVICE
PACIFIC OCEANIC FISHERY
INVESTIGATIONS

MEDDELELSER

FRA

KOMMISSIONEN FOR HAVUNDERSØGELSER

SERIE: FISKERI · BIND II

NR. 1. C. G. JOH. PETERSEN: ON THE LARVAL AND POST-LARVAL STAGES OF SOME *PLEURONECTIDÆ (PLEURONECTES, ZEUGOPTERUS)*

KØBENHAVN
I KOMMISSION HOS C. A. REITZEL
BIANCO LUNOS BOGTRYKKERI
1906

MEDDELELSER

FRA

KOMMISSIONEN FOR HAVUNDERSØGELSER

SERIE: FISKERI

BIND II

KOMMISSIONEN FOR HAVUNDERSØGELSER (The Danish Committee for the Study of the Sea) is appointed by LANDBRUGSMINISTERIET (the Danish Board of Agriculture) with the duty to carry out the Danish part of work to be done in the INTERNATIONAL COOPERATION FOR THE STUDY OF THE SEA. The Committee consists of the undersigned four members.

Dr. phil. C. G. Joh. Petersen is the Chairman and the Director of the Fisheries Investigations carried out by the Committee. Havnekapitain C. F. Drechsel is specially charged with the equipment and management of the researchsteamer "Thor". Docent Martin Knudsen is Secretary to the Committee and Director of the Hydrographic Investigations. Museumsinspektør C. H. Ostenfeld is Director of the Plankton Investigations. The Committee intends to publish its Reports (Meddelelser) in three series, that is to say Serie: Fiskeri, Serie: Plankton and Serie: Hydrografi. These Reports are to be issued in 4to either in the English or in the German language. Some occasional papers (Skrifter) are to be issued in 8vo and printed in Danish.

August 1904

C. F. Drechsel

C. G. Joh. Petersen
Chairman

C. H. Ostenfeld

Martin Knudsen
Secretary

MEDDELELSER FRA KOMMISSIONEN FOR HAVUNDERSØGELSER
SERIE: FISKERI · BIND II · NR. 1 · 1906

ON THE LARVAL AND POST-LARVAL STAGES OF SOME *PLEURONECTIDÆ*

(*PLEURONECTES, ZEUGOPTERUS*)

BY

C. G. JOH. PETERSEN

KØBENHAVN
I KOMMISSION HOS C. A. REITZEL
BIANCO LUNOS BOGTRYKKERI
1906

In "Meddelelser fra Kommissionen for Havundersøgelser, Serie Fiskeri Bd. I. Nr. 1, 1904", I have given some preliminary notes on the determination of the early stages of the plaice, dab and flounder (l. c. p. 10—12). Since that time a considerable amount of work with these fish young, whose correct separation is of great importance, has been carried on in most of the countries taking part in the "international study of the sea". The plaice especially is a fish of such great economical importance that even for this reason alone we must study all that concerns its young; further, the young of other species resemble those of the plaice so much that confusion between them is not only possible but has actually occurred in the literature of the subject. I believe that to such a confusion is due, for example, the statement that the young of the plaice in the early bottom-stage have been found in deep water; and this shows the danger and difficulty, as what is characteristic of this stage of the plaice is just that it lives in very shallow water, whilst the corresponding stage of the dab, with which the confusion has presumably occurred, lives in deep water. As to the part played by this different occurrence in the biology of these species, I need not enter into details here.

Some of these mistakes (Holt's) have already been commented on (l. c.), but I may mention further here that one of them has recently found its way into one of our "Publications de Circonstance", Nr. 3, Tab. VII, Fig. 6; this has been taken from Holt and is given as being a dab, but is in reality a plaice. Holt's Figure 112 (Trans. R. Dub. S., N. S. vol. V. Plate XIV) represents a specimen which he has kindly sent me for examination. I found it had 13 abdominal vertebræ and was thus a plaice, which is also shown in the drawing by the slender form. The number of vertebræ shown in the drawing, ca. 11, was thus incorrect.

A very considerable part of the labours of the international Committee C_2, has consisted in working out the plaice, dab and flounder material collected in the various countries. I have also had good opportunities in Danish waters of examining the living specimens at sea, and I have in this way had no little experience in separating the species from one another. I believe therefore that it will be of some importance to publish what I know about the matter as an aid to future investigators; but I do not propose to give detailed descriptions of the separate stages, which has often been done, more or less correctly, and most recently by so careful an investigator as Ehrenbaum in "Nordisches Plankton, 4 Lief. I. Eier und Larven von Fischen, 1 Teil"; I only wish to give some fairly characteristic figures with short practical hints which might assist in the determination of material collected, both living and preserved. The youngest stages of all and the eggs I leave quite out of consideration; they are so well known and described from hatching them out, that I have nothing new to add here. On this occasion I lay great weight on the figures accompanying this paper; they have been drawn under *camera lucida* as exactly as possible; I have given so many figures of each species (6—7) that the determination of all the older stages may with their assistance be rendered easy from the external appearance alone; but I may add that the youngest stage of the flounder Fig. 14 has not been executed quite successfully, it is too broad, which has arisen from the preservation (squeezed between cover-glass and slide); the method

of preservation is also the cause of the youngest stage of the plaice Fig. 1 having a pointed tail. In all three species the tail has almost the same form. EHRENBAUM's work already mentioned also gives figures of all three species, but these figures seem to me by no means to make the publication of mine superfluous.

To begin with I assume that all other species than the three mentioned here, plaice, dab and flounder, have been separated out from the material collected; the large number of fin-rays in *Pl. microcephalus* and *cynoglossus* readily distinguishes these species; there remains then the young of *Drepanopsetta platessoides*. In the plankton stages these are distinguished from the young plaice and dab by their form, size and pigmentation (see PETERSEN, l. c.), and in the bottom-stages, where they live together with the dab only, by amongst other characters the number of vertebræ (PETERSEN, l. c. p. 11); further, after transformation they are fairly large, have a large mouth and their body is very elongated especially towards the tail; finally, they lack the characteristic arch of the lateral line of the dab; as soon as the lateral line is developed the dab is by this character easily distinguished from all other flatfishes. When the material consists of fully developed bottom-stages of the plaice, dab and flounder the differentiation of the species can readily be made by means of another character, namely, the number of rays in the caudal fin. Dr. TH. MORTENSEN, to whom I gave the task of counting the number of rays in the caudal fin in a large number of specimens, has given the following report thereon:

"The number of rays in the caudal fin is of good assistance in distinguishing between small specimens of plaice, flounder and dab. The investigation of the following material has given the following results with respect to the variation in the number of rays in the caudal fin in the 3 species mentioned.

Number of rays in the caudal fin:

Species	Region	16	17	18	19	20	21	22	Number of specimens
		%	%	%	%	%	%	%	
Plaice	Iceland				1·8	90	6·8	1·4	221
	North Sea			1·5	19·4	69·4	9	0·7	134
	North. Kattegat			2	19·7	69·4	8·9		203
	South. Kattegat			5 1	22	66·9	5·5	0·5	236
Dab	Iceland			99·06	0·94				106
	North Sea—Kattegat		2	97·03	0·7				146
Flounder	North Sea—Kattegat	1·8	18	79·9	0·3				284

It thus appears that 20 or more rays in the caudal fin have not been observed in the dab or flounder, and we may therefore take it as certain that the specimens with this number of rays in the caudal fin are plaice. Similarly for the Icelandic waters (where the flounder does not occur) the specimens with only 18 rays in the caudal fin are certainly dabs; no specimens of the plaice having been found with only 18 rays in the caudal fin. It may further be taken for granted that specimens with only 17 caudal rays are either dab or flounder. Specimens with only 16 caudal rays occur only amongst the flounder, so that this seldom occurring number certainly shows the specimen to be a flounder. With 18 or 19 rays in the caudal fin, there is a great probability (apart from the condition at Iceland) that the specimen is a dab or a flounder when it has 18 rays and a plaice when it has 19; but there cannot be complete certainty and the number of abdominal vertebræ must be taken into account, if the other specific characters (number of rays in dorsal and anal fins, lateral line etc.) are not developed.

It appears from the tables, that the size at which the caudal rays are fully formed varies in different specimens of the same species. This may arise however partly from preservation, partly from the condition that a reduction in size may occur during transformation.

The central rays in the caudal fin are formed first, the outer latest, and the uppermost dorsal rays are developed somewhat later than the ventral (on account of the absorption of the notochord). New rays are not laid down later beyond the others when once the full number has been reached.

The caudal rays are developed before those of the dorsal and anal fins; this has a certain amount of importance since they can be used with some certainty to determine the species. It does not seem possible to find other certain marks of recognition than the number of rays, vertebræ, lateral line (dab) and spines (flounder).

It is peculiar that, when 19 caudal rays occur in the plaice or 17 in the flounder, it is most usual that the smaller number of rays than the normal is found in the upper half of the fin. The condition is shown by the following table.

Plaice.	North Sea	22	out of	26	specimens	have only	9	dorsal caudal rays.
	—	4	—	-	—	—	-	ventral —
	North. Kattegat	35	—	38	—	—	-	dorsal —
	—	3	—	-	—	—	-	ventral —
	South. Kattegat	47	—	50	—	—	-	dorsal —
	—	3	—	-	—	—	-	ventral —
Flounder.	North Sea—Kattegat	40	—	51	—	—	8	dorsal —
	—	11	—	-	—	—	-	ventral —

This condition may well be in connection with the fact, that the notochord originally extends out into the dorsal portion of the caudal fin, so that it is perhaps only from lack of space that fewer rays occur relatively more frequently there than in the ventral portion. When 21 rays occur in the caudal fin the extra ray seems to be equally frequent in the dorsal and ventral portions. In one specimen of a plaice (Esbjerg) with 20 caudal rays, 11 occurred in the ventral and 9 in the dorsal portion.

The difference in the number of rays in the Icelandic and Danish plaice is striking; this alone seems to show that the Icelandic plaice is a special race or local form. The North Sea plaice agree exactly with those of the northern Kattegat in regard to the number of caudal rays, whereas the southern race in Danish waters shows a tendency towards even lower numbers than the North Sea race. With regard to the dab, it is perhaps also possible that the percentages indicate a lower number of rays in the North Sea—Kattegat specimens than in those from Iceland."

It thus appears, that the number of caudal rays alone is very useful for the purpose of distinguishing these species, but in cases of doubt we must undertake the more difficult task of counting the vertebræ. I have already given detailed information regarding these (loc. cit. p. 11) and need only repeat, that the *plaice* has as a rule 12—13 abdominal vertebræ, the *dab* 10—11 and the *flounder* 10—12; in addition, the last has only 23—26 caudal vertebræ, the others 28—31. These numbers can further be supported by counting the rays in the two unpaired fins; the small number in the flounder separating this species from the other two. Cases of doubt might perhaps still occur between the flounder and plaice; but such may also occur with the adults. For a purely practical preliminary orientation the following table can be used:

	Abdominal vertebræ	Caudal vertebræ	Rays in anal fin	Caudal rays
Plaice	12—**13**—14	28—31—32	43—61	19—**20**—21
Flounder	10—12	**22—26**	**34—46**	**18**
Dab	9—**10**—11	28—31	50—62	16—17—**18**

I may remark however that with some practice other characteristics can be quickly noted, which help in the determination, such as, the large eyes of the dab, the small roughnesses along the base of the unpaired fins in the flounder, the longer caudal peduncle of this species which distinguishes it both from the plaice and dab; I do not refer here to the length of the caudal fin, but to the part which lies between this fin and a line drawn through the hindmost rays of the unpaired fins. Figs 18 and 19 Tab. 1 show that this peduncle is already very long in comparison with the corresponding part in the dab and plaice; it is perhaps in relation to the small number of rays in the unpaired fins in the flounder. Further, transformation takes place in the flounder at a small size, 8—9 mm. in length, the dab is much larger when transformed and the plaice is intermediate.

As regards the determination of the pelagic stages, the difference in size mentioned above is very recognisable in the three species; but they vary much from one region to another and it can only be said, that the pelagic form of the dab is the largest of the three species; the amount of pigmentation also varies a great deal. The stages represented in the Plate were all taken in the waters within the Skaw and are reproduced in exactly the same proportion, 7·3, to the natural size, so that the Plate gives directly a fairly correct picture of the relative sizes.

All the specimens drawn represent certainly the pelagic stage with exception of those shown in Figs 6, 12, 13, 17 and 18; these were taken by the young-fish trawl at the bottom, so that nothing certain is known regarding them. The specimen shown in Fig. 19 was taken on the beach at Esbjerg. I think that the specimens shown in Figs 17 and 18 at least were living pelagically, either near the bottom, or they have been taken when the trawl was being let down or drawn up. It is not always easy to determine whether a fish is living pelagically or not, as it may well be following sometimes the one sometimes the other mode of life, as with the eel, which when just metamorphosed seems to live pelagically at night but remains on the bottom in the daytime. Nor can one always know, whether the fishing apparatus has taken a young fish quite close over or actually on the bottom, or in letting down or hauling up.

When the left eye is about to cross over the ridge of the head and the pectorals are reduced in size in the flounder-group, the decrease in size occurs and the pigmentation on the right side is increased. Life on the bottom certainly begins about this time.

There is one feature I must still mention, namely, that the pelagic stages of these species, as of so many other flatfishes and amongst others of the eel, become less in size when changing over to the bottom-stage; compare Figs 18 and 19. 5 and 6 and 11 and 12.

There is also another feature, however, which should be mentioned here regarding the size of the flounder-group of fishes in the larval stage, namely, that the corresponding stages of development are by no means of the same size in different regions; this does not apply *perhaps* to the flounder but to the plaice and especially the dab. From Iceland I have obtained pelagic dabs up to a length of 20 mm., with large larval pectorals, the eye on the ridge and with the right side strongly pigmented, whilst the corresponding stages in Denmark (Fig. 11) have a length of only 13·6 mm. There is on the whole no small difference in the larvæ of the same species of these fishes from different regions of Northern Europe; this has to be remembered when determining them.

If living pelagic larvae of these 3 species can be examined, the yellow colouration of the flounder makes it readily recognisable even with the naked eye or the lens; this yellow colour is specially conspicuous behind the anus and extends right out to the border of the anal fin. The other two species have nothing corresponding to this, except the dab just hatched, when it can on the whole be scarcely distinguished from the flounder; both have then a yellow belt across the tail; this disappears soon however in the dab, in which as in the plaice rose-red pigment then appears. This pigment is never seen in the pelagic stages of the flounder. Whilst the flounder is thus yellow, the plaice and dab are transparent with rose-red pigment in the pelagic stages. These colours do not remain long however in formalin or

spirit, but even then one may easily recognise the flounder from its closely packed, black pigment cells, which extend in rows along the rays of the anal fin, as is shown in all the Figures 14—18. Its small size on metamorphosis and its long caudal peduncle as mentioned above (see Figs 18—19) are also so characteristic, that one can readily separate it in good material from the two other species by these features alone. On the other hand, it is not always easy to separate the plaice and dab. In the corresponding stages however the plaice is more elongated and less broad (high) than the dab, and has a smaller head and shorter mandible. The dab is thus thicker (higher), than the plaice. The pigment along the base of the anal fin is more distinctly arranged in two regular rows in the dab than in the plaice (compare Figs 7—13 and 1—6). The pectorals are as a rule larger in the dab, and they have distinct black pigment spots along their margin (see Figs 9—10), which the plaice lacks almost entirely. Thus, if we compare Fig. 3 showing a plaice with Fig. 9 a dab of about the same stage, the anterior part of the body in the dab is seen to be much broader and larger than in the plaice, the head is larger in the dab and its eyes are further away from the tip of the snout; in the plaice on the other hand the eyes are specially far forward and finally the whole fish is distinctly thinner than the dab. In the older pelagic stages the dab becomes much larger than the plaice in the open sea, but at Denmark only a little larger (compare Fig. 11 with Fig. 5), and the dab is more pigmented than the plaice before transformation. In the stages shown in Figs 11—13 the caudal fin in the dab is longer than in the plaice, and the number of the caudal rays, 18 in the dab and 20 in the plaice, now enable a good determination to be made.

It is only when the dab arrives at the bottom, that its eyes begin to grow large (Fig. 13). It then undergoes a series of changes, which makes it much less broad than the corresponding bottom-stages of the plaice and which finally end in the easily recognised fish with the large eyes and arch in the lateral line. This difference in breadth is not yet noticeable in the 3 bottom-stages shown in the tables (Figs 6, 13 and 19), but it becomes very obvious in the following older stages. The dab and long-rough dab resemble one another in this regard, whilst the plaice resembles the flounder with its rounder shaped body.

My advice to those who wish to determine the bottom-stages of the plaice, flounder and dab is as follows:

(1) look at the form of the lateral line (dab),
(2) see whether spines are present along the base of the unpaired fins (flounder),
(3) see whether caudal peduncle is long (flounder),
(4) count the number of caudal rays (plaice has about 20),
(5) count the number of anal rays (flounder has but few),
(6) see if the body-form is specially elongated (dab),
(7) finally, if all else fails, count the vertebræ.

If the pelagic stages have to be determined:

(1) look for rows of black pigment along the rays of the anal fin (flounder),
(2) see if body-form is long and narrow (plaice),
(3) if the pectorals have black pigment spots on the margin (dab),
(4) count the caudal rays and abdominal vertebræ,
(5) take note of the size.

Without a great deal of practice also single specimens should never be determined from external appearance alone; this is only possible when one has at hand long series of well preserved specimens of different sizes. With a large material the occurrence (time and place) gives good help towards determination, when one is experienced in the matter.

Zeugopterus boscii and *unimaculatus*.

(Preliminary note.)

Larvæ of *Zeugopterus megastoma*, as represented in "Report XII, Dan. Biol. Station 1904", Pl. I, Fig. 9—10, occur very commonly in our collections, also those of *Z. norvegicus*, loc. cit. Fig. 6—7 (8); further, *Zeug. punctatus*, loc. cit. Fig. 1—4 (5), was found both at the Hebrides and in the English Channel, in the latter however only two specimens coming nearest in resemblance to Fig. 2 and 4 loc. cit. Further, 11 larvae of a *Zeugopterus*-species I had never seen previously were taken in the English Channel (Dungeness), but which were easily recognised as a *Zeugopterus* from the well-developed pair of spines on the head. In form and stage of development the larvae have a great resemblance to those shown in Figs 1—2 loc. cit., especially in the same characteristic form of the head, peculiar snout and position of the anus almost under the mid-point of the body or even further back; the form of the tail also greatly resembles that figured, but in regard to pigmentation they are very distinct from the species referred to. In this regard they show an exceedingly great resemblance to the early stages of *Z. norvegicus*, Fig. 6 loc. cit., as they are evenly punctated with small pigment spots over the whole of the body on both sides. The largest and most developed specimen with distinctly formed caudal, anal and dorsal rays was quite symmetrical but only 7 mm. long. The larvae must therefore belong to a small species nearly related to *Z. punctatus* and I have no doubt that they are specimens of *Z. unimaculatus*, the only species that can come in question owing to its geographical distribution and its total absence in Danish and Scandinavian waters. In Denmark both *Z. punctatus* and *norvegicus* are known as well as their larvae, and the larvae in question cannot be *Z. megastoma* as the larva of this species is much larger and its rows of pigment are very characteristic. The most developed specimen has at least 60 anal rays; the dorsal fin is too damaged to permit of its rays being counted.

As we thus know a new species, different from the 3 *Zeugopterus*-larvae previously described by me, which is not found further north than the Channel, whilst the other 3 are known further north, I have no doubt that we have here the more southerly relative of *Z. punctatus*, namely, *Z. unimaculatus*. There is only one other species of *Zeugopterus*, whose larvae have up to the present been unknown, namely, *Z. boscii*. The larvae mentioned above cannot however belong to this species as the collections of the "Thor" contain also another kind of larva, which belongs without doubt to *Z. boscii* and which is quite different from all the 4 species already mentioned.

These last larvae were all found off the Hebrides, 9 in number in all. The largest, which has just become a little asymmetrical, is only 10 mm. in length; a number of rays are already laid down in the unpaired fins; I should scarcely have recognised the smallest as belonging to the *Zeugopterus* genus, if they had not been connected in a continuous series with the large. The spines on the head of these larvae are always very small; in the larger a distinct Zeugopteroid grouping of spines is present in the otolith region, showing 2 or 3 spines; further, smaller spines reminding one of Rhombus are present on the gill cover. Apart from that they are easily recognised from their pigmentation which resembles greatly the spotted pigmentation of the young *P. microcephalus*, having amongst other things the pigment spots on the margin of the unpaired fins like this species. The specimens are short and somewhat broad in form and thus recall the body-form of the adult *Z. boscii*; further, they have already a very large mouth, but the eyes in these pelagic stages are still small and circular. The number of precaudal vertebræ in these larvae corresponds with that in *Z. boscii*, as also the peculiar curvature of the column.

Judging from these specimens I doubt still less than before that my Fig. 11 loc. cit., from Holt, belongs to *Z. boscii*; as we now know that the spines of the young larvae are very small, we may take it that in Holt's specimen the spines had quite disappeared.

The reason for my haste in announcing these discoveries at present in this preliminary manner

is to prevent any further appearance of erroneous determinations in the literature of these fish larvae, more than have already appeared even after I had published loc. cit. my earlier descriptions; the two points I had not been able to explain there, namely, the appearance of the larvae of *Z. boscii* and *unimaculatus*, have now been cleared up, and though the series for these two species, especially for *Z. unimaculatus*, might be made more continuous right up to the adult form, yet the geographical distribution gives such clear information that all doubt is at an end.

I may here further remark that, after I had published my descriptions, mentioned above, in the XII[th] Report of the Biol. Station and using these, EHRENBAUM in "Nordisches Plankton", 4 Lief. I Teil I, 1905, has entered upon the description of the larvae of the *Zeugopterus* genus and on various points has not followed my account, which could not certainly be considered incontestable in all details; his description however suffers from various other faults. I do not wish to touch upon the artificially hatched specimens here, they should be quite reliable, but I must distinctly object to several of EHRENBAUM's other determinations. For example, he refers a larva, his Fig. 80 g, to *Z. punctatus* which is undoubtedly a *Z. norvegicus*, as its pigmentation, form of head and size of the tail clearly show; the fish is also on the whole too large, which is mentioned by EHRENBAUM himself p. 210. The figure was made from a balsam-preparation on which he could not determine whether the spines were absent or not. I am certain that the spines are absent as in all other *Z. norvegicus*. He has relied only on the number of fin-rays; but how deceptive these can be I have already shown.

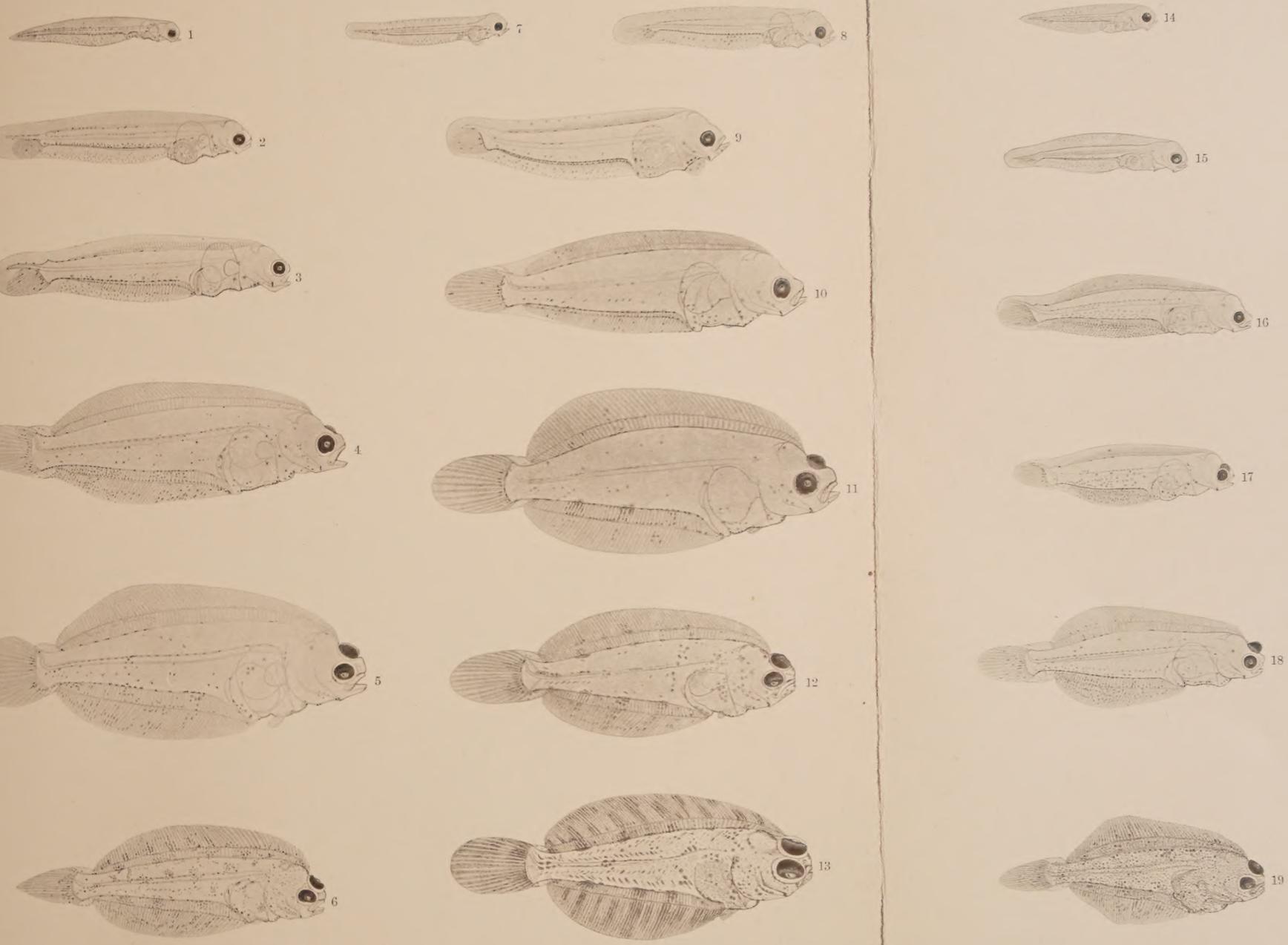
With regard to his Fig. 81 f I am unable to speak with certainty, as it is not stated whether the specimen in question had spines or not; he refers it to *Z. norvegicus*. To *Z. unimaculatus* he refers two smooth larvae Fig. 82 b—c, from HOLT; they lack spines and as we now know are not *unimaculatus*, as the larvae of this have spines; they are certainly *Z. norvegicus* as I have already tried to show. EHRENBAUM does not seem to have been clear as to the systematic importance of the "otocystic spines", just as he seems to have had only the young of *Z. norvegicus* in his own material. I can thus understand how he who is otherwise so exact and critical has made this mistake of referring specimens of the spineless *Z. norvegicus* to all 3 related species; it is only *Z. norvegicus* that has no spines.

550 [14]/III 1906

Explanation of Plate I.

All the figures are 7·3 times larger than the actual specimens.

Fig. 1. Plaice 5·8 mm. long, batched from egg taken in the Great Belt. 25—III—1904.
„ 2. „ 9 mm. „ , west from Ærø. 6—V—04.
„ 3. „ 10 mm. „ , east from Soby (Ærø). 17—V—04.
„ 4. „ 12·5 mm. „ , at the Skaw. 28—IV—04.
„ 5. „ 13·2 mm. „ , „ 28—IV—04.
„ 6. „ 10·5 mm. „ , at Kerteminde (Great Belt) with young-fish trawl at bottom. 19—V—04.
„ 7. Dab 5·5 mm. „ , Frederikshavn. 26—V—04.
„ 8. „ 7·5 mm. „ , South-west. Kattegat. 31—V—04.
„ 9. „ 9·5 mm. „ , Southern Kattegat (Hesselø). 6—VI—04.
„ 10. „ 12 mm. „ , North. Kattegat (east of Læsø). 3—VI—04.
„ 11. „ 13·6 mm. „ , „ „ 3—VI—04.
„ 12. „ 11·5 mm. „ , Great Belt. 30—VII—04.
„ 13. „ 12 mm. „ , Baltic, east of Fehmarn; taken with young-fish trawl on bottom. 26—VIII—04.
„ 14. Flounder 4·5 mm. „ , West of Ærø. 6—V—04.
„ 15. „ 6·2 mm. „ , „ „ „ 30—V—04.
„ 16. „ 8·5 mm. „ , „ „ „ 30—V—04.
„ 17. „ 7·2 mm. „ , Kerteminde; taken with young-fish trawl at bottom, 2 fm. 19—V—04.
„ 18. „ 9·5 mm. „ , „ „ „ 19—V—04.
„ 19. „ 8·5 mm. „ , Esbjerg beach. 21—V—04.



H. V. Westergaard del.

Bianco Lunos Bogtrykkeri